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Agricultural Experiment Station

SOIL REPORT No. 65

BOONE COUNTY SOILS

By HERMAN WASCHER, R. S. SMITH, AND L. H. SMITH



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"It must be remembered that the productive power of the soil is the basic support of all prosperity."

C. G. HOPKINS

"It is the duty of every landowner to see that his land when he leaves it is as good or better than when he received it."

J. G. MOSIER

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INTRODUCTORY NOTE

IT IS A MATTER of common observation that soils vary tremendously in their productive power, depending upon their physical condition, their chemical composition, and their biological activities. For any comprehensive plan of soil improvement looking toward the permanent maintenance of our agricultural lands, a definite knowledge of the various existing kinds or types of soil is a first essential. It is the purpose of a soil survey to classify the various kinds of soil of a given area in such a manner as to permit definite characterization for description and for mapping. With the information that such a survey affords, every farmer or landowner of the surveyed area has at hand the basis for a rational system for the improvement of his land. At the same time the Experiment Station is furnished a scientific inventory of the soils of the state; and with such an inventory as a basis it can proceed intelligently to plan those fundamental investigations so necessary for the solution of problems of practical soil improvement.

This county soil report is one of a series reporting the results of the soil survey which, when completed, will cover the state of Illinois. Each county report is intended to be as nearly complete in itself as it is practicable to make it, even at the expense of some repetition.

While the authors must assume the responsibility for the presentation of this report, it should be understood that the material for it represents the contribution of a considerable number of the present and former members of the Agronomy Department working in their respective lines of soil mapping, soil analysis, and experiment field investigation.

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BOONE COUNTY SOILS

By HERMAN WASCHER, R. S. SMITH, and L. H. SMITH¹

GEOGRAPHICAL AND HISTORICAL FEATURES

BOONE COUNTY lies along the northern boundary of Illinois about 45 miles west of Lake Michigan. It is rectangular in shape, being roughly 12 miles wide east and west by 24 miles long north and south, and has an area of about 280 square miles. Named after the famous woodsman and hunter, Daniel Boone, this county was established by state legislative act in 1837 from

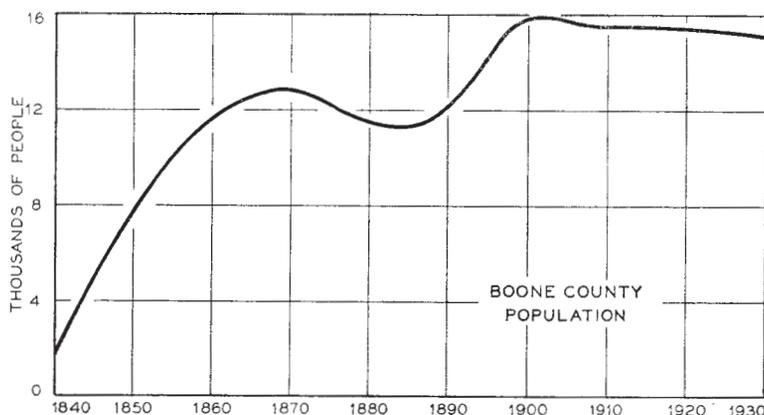


FIG. 1.—GROWTH OF POPULATION IN BOONE COUNTY

A century ago the population of Boone county was about 1,700. By 1870 it had increased to nearly 13,000. A sharp rise between 1890 and 1900 brought it to 16,000 at the latter date, near which point it has since remained.

a portion of Winnebago county. Belvidere, the county seat, was laid out in the same year. It was not until 1843, however, that the present county boundary lines were agreed upon and definitely established.

The first settlements in the county were made early in 1835 near the present site of Belvidere and at Shattucks Grove in Spring township. Late in the same year the native Pottawatomie tribes evacuated the region, and in 1836 and the following years settlement progressed rapidly, many of the early settlers coming from New York state and New England. Population continued to increase rapidly until 1870, when there were nearly 13,000 inhabitants in the county. About 1880 a slight decrease occurred, after which the trend was again upward, the 1900 Census reporting 15,800 inhabitants. Since 1900 the population has remained fairly constant at slightly more than 15,000 (Fig. 1).

Facilities for the marketing of agricultural products are well established. Railway and paved highway systems furnish direct routes to the Chicago markets, while gravel surfacing on the side roads furnishes all-weather outlets for practically every farmstead in the county.

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Agricultural Production

During the earliest years forest cutting and tree products were important sources of cash income. Following the general clearing and settlement of the land and the opening of outlets to the large markets by means of railway construction, grain and livestock production became the chief sources of wealth in the county. Within recent years, however, the trend has been gradually toward dairying and the sale of whole milk. This trend has been accelerated by the introduction of modern facilities for the handling and transportation of fresh milk.

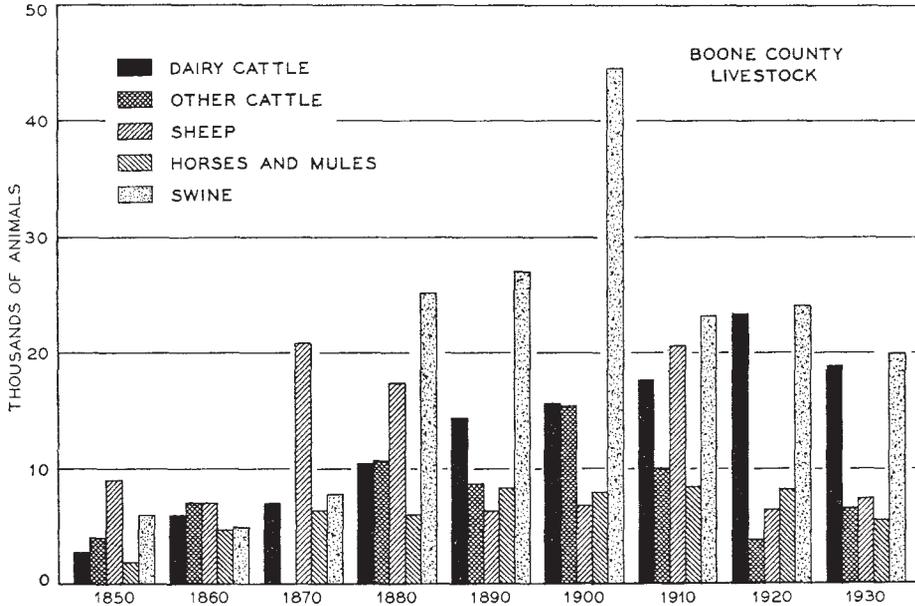


FIG. 2.—PRODUCTION OF PRINCIPAL CLASSES OF LIVESTOCK IN BOONE COUNTY

Lying as it does in the Chicago milkshed, Boone county has a high proportion of dairy cattle among its livestock. In 1920 the number had reached 23,000, but at the time of the last Census had dropped to about 19,000. The number of beef cattle has fluctuated widely, reaching a peak of more than 15,000 in 1900. Sheep is another class of livestock that has shown no regularity in number, more than 20,000 being reported in 1910 and only about one-third that number at subsequent Census dates. The number of horses and mules has followed the general trend for this class of livestock thruout the country, reaching the maximum in 1910 and then falling off with the advent of automotive power. Swine production also reached its maximum in 1900, when 44,000 head were reported. Only about half that number is shown for the later Census years.

From the standpoint of both acreage and value, corn has been, at least since 1870, the most important single field crop grown in Boone county. The highest acreage reported¹ was 52,500 acres in 1936, while the general county average for the thirteen-year period 1924 to 1936 inclusive was 46,600 acres. During the same period an average of 25,000 acres was devoted to oats, 20,000 acres to tame hay, and 17,300 acres to barley. Some wheat, rye, buckwheat, and soybeans were also grown. Home-grown fruit and vegetables have long been a part of the

¹All crop and livestock statistics given here are from the U. S. Census and "Illinois Crop and Live Stock Statistics," a joint publication of the Illinois State Department of Agriculture and the U. S. Department of Agriculture.

established family production, but prior to 1910 little of these crops reached farther than the local markets. Within the last quarter century, however, the production of a few of these crops, notably peas and sweet corn, has become of considerable commercial importance.

The decrease in virgin forest was tremendous immediately following settlement by the white man. Of the 70,000 acres of original forest area in Boone county, only 1,250 acres remained as unqualified woodland in 1930, tho an additional 9,100 acres was reported as woodland pasture. In 1935 about 1,900 acres of woodland were reported as not pastured.

Some idea of the trend in livestock production may be gained from Fig. 2, in which the numbers of cattle, sheep, horses and mules, and swine are graphically presented by ten-year intervals beginning with 1850. Census data for 1935 are not shown, but for that year the number of dairy cattle was reported to be 17,900, beef cattle 7,200, sheep 5,300, horses and mules 4,600, and swine 14,100.

Livestock production in Boone county reached a peak between 1900 and 1910 for all classes except dairy cattle. A decline in the number of dairy cattle began about 1920, yet the annual production of milk increased from about 7 million gallons to nearly 10 million gallons between 1920 and 1930. This increase in quantity of milk produced is due mainly to improvement in the general quality of the dairy animals; and the improvement has taken place in spite of the fact that almost 50 percent of the farms have been operated by tenants since 1900.

Poultry and egg production has always been an important source of farm income in Boone county, nearly 800,000 dozen eggs being produced in 1930. Beekeeping is a side-line that may quite properly be encouraged, especially in areas where an increase in the acreage of sweet clover is recommended.

Climate

The climate of Boone county is representative of that prevailing in the north-central United States, tho it is perhaps modified somewhat by Lake Michigan. It is characterized by a wide range in temperature between the extremes of winter and summer and by an irregularly distributed but relatively abundant rainfall. In the following paragraphs certain temperature, frost, and rainfall data are presented, which are based on records of the weather station at Rockford over the sixteen-year period 1921 to 1936 inclusive.

The mean summer temperature during this period was 70.5° F., the mean winter temperature was 27.7° F., and the average mean yearly temperature was 49.6° F. The highest temperature recorded was 112° F. in July, 1936, and the lowest -25° F. in February, 1933.

The average date of the last killing frost in the spring, according to these records, is May 8, and that of the first killing frost in the fall is October 12. This gives an average growing season of 157 days, which ordinarily provides ample time for the corn crop to reach maturity. The latest recorded killing frost in the spring was on May 25, 1925, and the earliest in the fall was on September 14, 1923. The shortest growing season, 124 days, occurred in 1923. The longest growing seasons, 183 days each, occurred in 1934 and 1936.

The average annual precipitation at Rockford for this same sixteen-year period was 33.32 inches, including the water melted from an average snowfall

of 28.7 inches. (About 10 inches of snow is equivalent to one inch of rainfall). The driest year in this period was 1922, when the total precipitation was 25.07 inches; while 1935 was the wettest year, with 43.69 inches of water. The driest months on the average were January and February, with precipitation of 1.23 inches per month. June and September were the wettest months, with an average of 4.28 inches; while April, July, and August averaged 3 inches or more, and May averaged 2.82 inches. These average figures would seem to indicate adequate rainfall thruout the growing season, but the fact is that rainless periods of sufficient length to be harmful occur at rather frequent intervals. Data from the Rockford Weather Station show that during this sixteen-year period there were 34 rainless periods during the growing season, exceeding 21 days in length. Thirteen of these periods lasted 40 days or longer, and 3 lasted more than 60 days.

Thus it may happen that even tho total monthly or yearly precipitation may be average or above, neither one of them is a good criterion of the amount of available moisture present in the soil at any specific time, because departures from the average are frequent and often wide. Furthermore, the rate of precipitation, rate of evaporation, and the absorptive and retentive capacity of the soil, as well as other soil and plant characteristics, are all important factors influencing the amount of moisture necessary for maximum crop production.

Topography and Drainage

The land surface of Boone county is rather uneven, varying from flat to rolling, with a few short, steep slopes along some of the stream bluffs. Several broad, flat terraces occur along the larger streams; and many smaller, nearly level areas are found in all parts of the county, particularly along the drainage ways. There are also numerous scattered hills and ridges; these are most noticeable in the southern and eastern parts of the county, and their occurrence there will be discussed at greater length in the section on the formation of Boone county soils, page 7. The rolling, hilly land along the north side of Piscasaw creek, the north side of Beaver creek, and in the northwestern part of the county is due mainly to water erosion. All these various topographic features have a definite bearing on drainage, and will be considered in more detail.

The lowest point in the county is in the Kishwaukee river channel where it leaves Boone and enters Winnebago county. It is shown on the geological topographic map as being 733 feet above sea level. The highest point is in the northeastern corner of the county, in Section 12, Township 46 North, Range 4 East, and is indicated as being 1,051 feet above sea level. Thus the maximum range in relief for the county is 318 feet. The general range, however, is from about 775 to 1,000 feet in the northern part of the county and from 775 to about 900 feet in the southern part.

Drainage is furnished, for the most part, by Kishwaukee river and its tributaries, tho a considerable area in the northwestern part of the county drains west directly into Rock river. Also, a small portion in the southern part first drains south into the south branch of Kishwaukee river, then west into the Kishwaukee proper, and further into Rock river.

Natural streams and drainage courses are, for the most part, well established, thus providing numerous outlets for the removal of excess surface water. In a

few of the rather level areas, however, surface gradient is very slight or entirely lacking, and the water table remains too high thru much of the year for ordinary tillage operations. At the present time these areas are mostly in pasture, tho some of them are much too wet to grow good bluegrass. This problem will be treated at greater length in the discussion of soil development, page 8.

FORMATION OF BOONE COUNTY SOILS

Origin of Soil Material

The nature of Boone county soils can be more readily understood if one has a knowledge of the formation and composition of the material from which they have been derived. The mineral material was deposited during the Glacial Epoch, and it was thru action in glacial times and subsequent erosion that the present topography was determined. The underlying bedrock, now exposed in a very few places, served as a foundation for the loose, unconsolidated, surface mantle left by the glaciers, but contributed only indirectly as the source of the present soil material.

The general average temperature during the glacial periods was lower than at present. Snow and ice collected in regions to the north in such amounts that the masses pushed outward from centers of accumulation, forming glaciers. It is believed the important continental glaciers attained a maximum thickness of at least five or six thousand feet. These glaciers advanced chiefly southward, aided by further accumulation of snow and ice at their margins, until a change in climate produced temperatures high enough to melt the ice as rapidly as it advanced. In moving across the country from the far north, the ice gathered up all sorts and sizes of materials, including clay, sand, gravel, boulders, and even immense masses of rock. Some of these materials were carried almost intact, over great distances, frozen in the ice. Others were rubbed against rock surfaces, or between slipping ice masses, until ground to powder. The great bulk of the material carried, however, derived from the loose surface mantle and old bedrock material, was usually deposited within a few miles of its origin. This general deposit of rock material left by the glacier is known as glacial drift; it includes all unstratified material, or material dropped in place, called "till," as well as the reworked, more or less stratified "outwash" materials such as gravels, sands, and silts. The terms "till" and "outwash" will appear frequently in the description of the individual soil types.

Under the enormous pressure of the ice, hills were leveled off and old valleys filled in, thus greatly changing the features of the surface over which the ice passed and completely obliterating the previous topography. Thus the innumerable knobs and ridges making up much of the present upland topography of Boone county are mainly the result of direct glacial deposition. North and west of Kishwaukee river and Piskasaw creek subsequent erosion and deposition have somewhat modified the original glacial topography.

There were at least four great periods during which ice sheets moved down from the north. These periods probably all included more than one distinct movement of ice, each of which covered a part of the continent, altho the same parts were not covered during each advance. The ice movements of the different glacial

periods were separated by long intervals of time, during which the climate was probably similar to that now existing, and the country was clothed with vegetation. At least two of these glaciers, the Illinoian and the Wisconsin,¹ are known to have covered Boone county. Deposits left by the Illinoian are important north of Kishwaukee river and west and northwest of Piskasaw creek. South of the Kishwaukee and east of Piskasaw creek, including a strip one to two miles wide north of the Piskasaw, lying along the east county line, the Illinoian drift is deeply buried by the more recent deposits of the Wisconsin.² Consequently only material of the Wisconsin Age has exerted an influence on the character of the soils in this part of the county.

Glacial till is by far the most important material from which the soils of Boone county have been formed. Tho it is commonly a heterogeneous mixture of sand, silt, clay, gravel, and a scattering of large rocks or boulders, the proportion of these constituents varies considerably from place to place. There are a few small spots in the county where the till is so fine-textured as to impede underdrainage, and a few other spots where it is so coarse as to make the soil developed on it drouthy. With the exception of these few very small areas the glacial tills in Boone county are of such nature that water movement thru them is free but not excessively rapid.

All of the glacial till material in this county was also mixed with some ground-up limestone, and consequently was originally highly calcareous. Laboratory examination of a few samples of unweathered till taken in Boone and DeKalb counties showed a calcium carbonate equivalent of 25 to 30 percent.

Wind-blown silty material, designated as loess, is relatively unimportant in this county. In some of the low, flatter areas in the Illinoian glacial region there is a local deposition of silty material of varying thickness which may be wind-deposited, water-deposited, or may be a local surface deposit of silty till, or perhaps a combination of the three.

Water-deposited sandy and gravelly material is prevalent along most of the larger streams and in certain portions of the low areas in the southern and eastern parts of the county. Limestone bedrock has directly contributed but little to the soils of this county, tho a few small spots occur in Township 43 North, Range 3 East, in which the bedrock is within 3 to 4 feet of the surface.

All the materials outlined above, except possibly limestone bedrock, have influenced the development of the present soils of Boone county and are known as the "parent materials" of these soils.

How the Soils Were Developed

As soon as the parent glacial material was deposited, soil-forming processes began to change it into soil. These processes acted differently from place to place, due to such causes as differences in the original parent materials, slope of land surface, incoming vegetation, as well as other factors, and consequently the

¹Early geologists pronounced all of the glacial till in Boone county as belonging to one period called the "Iowan," but more recent investigators have reported it as belonging to two separate periods, as discussed above.

²The Soil Survey is indebted to Doctor G. K. Ekblaw, of the Illinois State Geological Survey, for assistance in establishing the boundary of the Wisconsin till.

products formed, which we call soils, began to show differences. With the continued action of weathering processes, these differences became more and more pronounced until finally soils with distinctly unlike characteristics were evolved. These dissimilar soils are called "soil types."

Soil types in their early stages are strongly under the influence of their parent materials; their distinguishing features are not clearly developed, and they are said to be young. As the time of weathering lengthens, the characteristics become



FIG. 3.—STUDYING THE SOIL PROFILE

One of the very pronounced characteristics observed in most soils is that they are composed of more or less distinct layers, or strata, often spoken of in soil literature as "horizons." The vertical section of the soil displaying the arrangement of these horizons from the surface down is called the "soil profile."

more clearly defined, and soils at this stage of development may be said to be progressing toward maturity and, eventually, to old age. Most of the soil types in Boone county would be classed as youthful or in early maturity. Within the Wisconsin glaciation the till material has been leached of its lime to a depth of 30 to 45 inches, while within the Illinoian glacial region the lime has been leached to a depth of 60 to 90 inches. It might be inferred, therefore, that the soils of the Illinoian glaciation are further along in their stage of development than those of the Wisconsin glaciation. As a matter of fact, however, such an inference is only partially true, for many of the types within the Illinoian region, altho resting on Illinoian till, were influenced by loess deposited during Wisconsin times and by glacial wash from the Wisconsin till-sheet, and they are therefore no further developed than many of the types in the Wisconsin till region.

As the physical and chemical agencies of weathering began acting on the silt, sand, and gravel particles left by the glaciers, forming thereby available plant nutrients, vegetation began to spread over the land.

Three types of vegetation—forest, prairie, and marsh, or swamp—have exerted important influence on the soils of Boone county during the time they

have been developing. Forest vegetation produces a thin accumulation of leaf and twig litter on the surface where it is exposed to the air; and being, therefore, subject to rather rapid and complete decay, it supplies little organic matter for the soil. Moreover the roots of trees are coarse, penetrate deeply and are relatively few in number. As compared with grass roots, they add little to the organic-matter supply when they decay. The soils in this county that have developed under a forest cover are therefore low in organic matter and are usually grayish or yellowish in color.

The grass vegetation of the prairies, on the other hand, produces enormous quantities of fibrous roots which are mostly concentrated in the surface 12 to 18 inches of the soil. Because air does not move freely thru the soil, these roots decay slowly and when decomposed the resulting organic residue tends to be preserved for a long period. Since the incorporation of organic matter in the soil produces a dark color, the grassland soils have brownish-colored surface strata.

Marsh or swamp vegetation also produces large quantities of fibrous roots; but the low-lying pond-like nature of a swamp area is conducive to a more or less permanent high water table which prohibits the entrance of oxygen and so practically prevents complete decomposition. Thus immense accumulations of organic matter were preserved in the wet areas of the lowlands and the soils became dark brown to black in color.

Differences in topography and drainage are important factors in the development of certain features peculiar to each soil type. Soil material in a depression in which the water table remains at or above the surface much of the year will develop a set of characteristics distinctly different from those developed by the same material on a hill where the water table remains several feet below the surface. The outstanding observable characteristic most affected is soil color. The poorly drained soil in the depression will be gray, except when modified by organic matter, while yellowish or reddish colors dominate the well-drained type on the hilltop, tho it also is subject to modification by organic matter.

For simplicity and ease of description, natural drainage is divided into *surface* drainage, which refers to surface runoff, and *underdrainage*, which refers to permeability of the subsoil and underlying material. Differences in surface drainage arise chiefly from differences in the gradient of the land surface, but the permeability of the underlying material is also a factor. Variations in erosiveness correlate similarly in that impermeable material erodes to a greater extent than does permeable material on the same slope. Differences in underdrainage determine the effectiveness of tile, since the rate of percolation of soil water is governed by permeability.

The relative conditions of surface drainage and underdrainage are designated by the terms *excessive*, *rapid*, *moderate*, and *slow*, or by such terms as *very rapid*, *moderately rapid*, etc. *Rapid* surface drainage indicates rapid runoff and consequently a tendency to erode: while rapid underdrainage indicates rather rapid percolation, small retentive power, and a tendency for drouthy conditions to exist unless the ground water table is high. *Moderate* surface drainage indicates satisfactory runoff, with only a small amount of erosion; while moderate underdrainage indicates relatively free movement of excess ground water to tile but good retention of moisture for plant growth. *Slow* surface drainage indicates prac-

tically no natural surface movement of water, and results in wet, swampy land; while slow underdrainage indicates a nearly impervious subsoil, with consequent slow downward percolation, with the result that tile may not draw well even if outlets are good.

In the humid, temperate climate of Illinois another pronounced effect of the weathering of soil material is the production of layers, or horizons, in the soil, each horizon having more or less definite characteristics. From a practical standpoint these various horizons can be described as *surface*, *subsurface*, and *subsoil*. The surface is usually the layer of greatest organic-matter accumulation and ordinarily is about plow depth in thickness tho it may be 12 to 15 inches, varying according to the soil type. The *subsurface* in young soils is generally a zone of gradation between the surface and the subsoil; but in old soils it may be a bleached, highly weathered layer, entirely different from either the overlying surface horizon or the underlying subsoil. The *subsoil* is usually the zone of greatest clay accumulation and consequently is more plastic and sticky than either the surface or the subsurface horizon above or the parent material below, and this condition generally becomes more pronounced as the soils age.

All these zones, or horizons, taken together constitute the "soil profile"; and differences in the arrangement, in the thickness, or in any other of the various physical and chemical features of the respective horizons constitute the basis upon which soil types are differentiated and the soil map constructed.

SOIL CLASSIFICATION AND MAPPING

In the soil survey the "soil type" is the unit of classification. Each soil type has definite characteristics upon which its separation from other types is based. These characteristics are inherent in the strata, or horizons, which constitute the soil profile in all mature soils. Among these characteristics may be mentioned color, structure, texture, and chemical composition. Topography and kind and character of vegetation are easily observed features of the landscape which are very useful indicators of soil character. Also, a knowledge of the geological origin and formation of the soil material of a region often makes possible a better understanding of the soil conditions that exist.

Failure to appreciate the fact that soil types are differentiated on the basis of the character of the entire soil profile, and not on the surface alone, often makes it difficult to understand what is meant by soil type. It frequently happens that the surface stratum of one soil type is no different from that of another, and yet the two types may be widely different in character as well as in agricultural value. It is of utmost importance, therefore, in studying descriptions of soil types, to get a clear mental picture of all the outstanding features of each type.

Variations within any given soil type as shown on a soil map are inevitable, even when a detailed map is made on a large scale; for many types exhibit a very gradual change from one to another, and to indicate all phases of the gradation would require an almost infinite number of types. Also, many small isolated spots of one or more distinct types must upon occasion be included with the prevailing type in the area in order to avoid confusion and to simplify the printed map. Such variations are covered as fully as practicable in the soil-type descriptions.

Twenty-six soil types are shown on the Boone county map. Less than half of them, or twelve, cover 90 percent of the total land area in the county, as indi-

TABLE 1.—BOONE COUNTY SOILS: AREAS OF THE DIFFERENT SOIL TYPES

Type No.	Type name	Area in square miles	Area in acres	Percent of total area
21	Pecatonica silt loam.....	67.72	43 340	24.14
22	Westville silt loam.....	17.48	11 190	6.23
24	Miami silt loam.....	15.24	9 750	5.43
25	Hennepin gravelly loam.....	.74	470	.26
40	Dodgeville silt loam.....	.25	160	.09
41	Muscataine silt loam.....	2.27	1 450	.81
52	Caledonia silt loam.....	27.99	17 910	9.98
59	Lisbon silt loam.....	2.55	1 630	.91
60	LaRose silt loam.....	3.18	2 040	1.13
62	Herbert silt loam.....	5.96	3 810	2.13
63	O'Neill sandy loam, terrace.....	2.84	1 820	1.01
76	Otter loam, bottom.....	16.30	10 430	5.81
79	O'Neill silt loam, terrace.....	11.24	7 190	4.01
81	Littleton silt loam, terrace.....	12.09	7 740	4.31
103	Muck.....	1.26	810	.45
134	Camden silt loam, terrace.....	4.39	2 810	1.57
137	Ellison silt loam, terrace.....	1.63	1 040	.58
145	Saybrook silt loam.....	47.55	30 430	16.95
148	Proctor silt loam.....	2.68	1 720	.96
149	Brenton silt loam.....	6.39	4 090	2.28
150	Onarga sandy loam.....	.51	330	.18
205	Miami sandy loam.....	.44	280	.16
224	Strawn silt loam.....	1.74	1 120	.62
225	Beaver silt loam.....	6.52	4 170	2.32
226	Capron silt loam.....	19.23	12 310	6.86
227	Argyle silt loam.....	2.16	1 380	.77
C.P.	Clay pit.....	.01	10	.01
G.P.	Gravel pit.....	.08	50	.03
L.Q.	Limestone quarry.....	.03	20	.01
	Total.....	280.47	179 500	100.00

cated in Table 1, where are shown the area of each type in square miles and in acres and the percentage each constitutes of the total area of the county. For the location and boundary of each soil type see the accompanying soil map.

SOIL TYPES OF BOONE COUNTY: THEIR USE, CARE, AND MANAGEMENT

A brief description of the outstanding characteristics of each of the twenty-six soil types mapped in Boone county, together with general recommendations as to the main factors to be considered in developing soil-treatment and management programs for them, is given on pages 15 to 34. Parts of this information will also be found in summary form in Table 2, page 35.

Scope of Use and Management Recommendations.—The recommendations made for the utilization of the various soil types in Boone county are based on the inherent capacity of a type to produce efficiently the general crops of the region. Such matters as adaptability for special crops, location of the land with

respect to markets, and other economic considerations have not been taken into account. Neither is an attempt made to outline a complete soil-improvement and management program that will fit every field or farm, for to do this one would need to know not only what soil types are included, but also what cropping and management practices have been followed in the past and what type of farming is to be followed in the future. Obviously all these details are beyond the scope of this report.

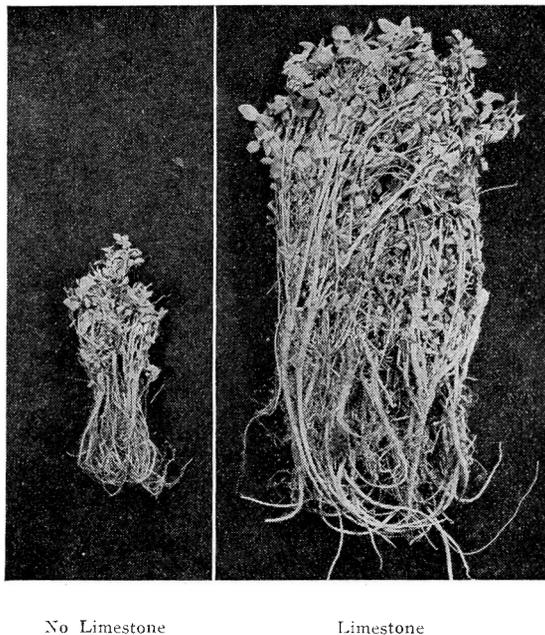


FIG. 4.—SWEET CLOVER DEMANDS LIMESTONE

These plants are from a second-year spring growth of sweet clover on one of the soil experiment fields. Each bundle is the growth from 4 square feet, the small one at the left having grown on unlimed soil, and the large one at the right on soil given a 2-ton application of limestone.

Why Soil Type Is Basis for Recommendations.—The necessity for recognizing soil type as the basis for working out any satisfactory soil-improvement program may be illustrated by noting the difference between the drainage, erosion, and fertility problems presented by Caledonia silt loam and Pecatonica silt loam, two contrasting types in Boone county.

In practically all places where Caledonia silt loam occurs, artificial drainage must be installed before the soil can be satisfactorily cultivated. Erosion is negligible, and for the most part fall plowing is a desirable practice. Fertilizer treatments are more or less of a special nature; that is, the most profitable fertilizer for a long time to come may possibly be one bearing a single plant-food constituent rather than a combination such as manure, limestone, and legumes, which is recommended for so many soils. This does not mean that barnyard manure, or even limestone, should never be applied to areas of Caledonia silt loam, or that legumes should never be grown and plowed down for green

manure; but it does mean that to use these materials and methods without some discrimination may not be good economy.

The treatment required by Pecatonica silt loam is very different. Artificial drainage tho desirable is not necessarily essential. Erosion is a problem, and fall plowing should not be practiced. The manure-limestone-legume treatment should be given first consideration in any well-planned, long-time improvement program for Pecatonica.

Tests for Individual Fields.—Since areas of the same soil type may differ widely in acidity and in their content of plant-food constituents, it is recommended that certain tests be made of individual fields where treatment to increase productivity is being planned. Tests for degree of acidity and general abundance of available phosphorus are explained in the following publications¹ of this Station:

Circular 346—Test Your Soil for Acidity

Circular 421—Testing Soil for Available Phosphorus.

The acidity test is not particularly difficult and can be made at a cost of only a few cents an acre by following carefully the instructions in Circular 346. The phosphorus test is slightly more complicated, and the results are sometimes difficult to interpret. It is therefore recommended that the county farm adviser be consulted for assistance in making this test.

For the potash test considerable equipment is required and some training is necessary; consequently it is not recommended that a farmer attempt this test unless he is willing to spend some time and money in acquiring these essentials. A method for making the test is explained in a mimeographed folder, which can be obtained on request.

Nitrogen Problem.—In many soils nitrogen is the most important limiting plant-food element. This is especially true in those light-colored soils developed under forest vegetation. Nitrogen and organic-matter deficiencies are often associated directly with soil acidity. In fact, the chief reason for applying limestone is to correct acidity so that leguminous crops which carry nitrogen-fixing bacteria on their roots can be grown. This problem is more completely outlined in Circular 326, "A Nitrogen Factory on Every Farm."

Probably the most economical method of introducing nitrogen into the soil is by plowing under sweet clover. Bulletin 394, "Sweet Clover in Illinois," will prove helpful in understanding the requirements of this crop. Fresh barnyard manure is also a good source of nitrogen, and numerous properly mixed commercial fertilizers carry a readily available supply of this element. Circular 439, "Fertilizer Treatments for Sweet Corn," presents some data that may be of special interest to those in the field of commercial sweet corn production, while Circular 465, "Pasture Improvement and Management" may prove helpful to those particularly interested in dairying and livestock production.

Other publications of the Illinois Agricultural Experiment Station that may appear from time to time will present more complete discussions of the various phases of soil fertility and soil conservation than the purpose of this report is intended to cover.

¹Publications mentioned in this report can be obtained free of charge by addressing the Illinois Agricultural Experiment Station, Urbana, Illinois.

Pecatonica silt loam (21)

Pecatonica silt loam is the most extensive soil type in Boone county. It is a light-colored soil derived from a silty covering on leached pebbly till and developed on undulating to rolling topography under a deciduous forest vegetation. It covers a large part of the northern half of Boone county and occupies an area of 67.72 square miles, or almost a quarter of the county.



FIG. 5.—PECATONICA SILT LOAM PARTLY CLEARED OF TIMBER

This is the most extensive soil type in Boone county, covering about 68 square miles. Altho naturally not a highly productive soil it responds to good soil-treatment and cropping practices. A good rotation should be established on this land.

The surface horizon averages about 5 to 7 inches in thickness and is a yellowish-gray silt loam low in organic matter and nitrogen and medium acid in reaction. In undisturbed forested areas the upper 2 or 3 inches of soil is dark gray or brownish gray. The subsurface is 6 to 8 inches thick and is a grayish-yellow friable silt loam. The subsoil is 8 to 12 inches thick and is a brownish-yellow to reddish-brown medium-compact and medium-plastic clay loam which breaks into $\frac{1}{4}$ - to $\frac{3}{4}$ -inch subangular aggregates. Below 26 to 30 inches the material is usually a reddish-brown leached sticky pebbly till to a depth of 60 inches or more. Below 60 to 90 inches the till is usually sandy, friable, and highly calcareous. Often on the less-sloping portions of this type, especially along the border of Type 226, there is a layer of yellowish silt of variable thickness between the subsoil and the leached underlying till. A scattering of pebbles and brownish iron concretions is often noticeable on the surface and thruout the profile.

In Boone county Pecatonica silt loam has developed on slopes ranging from 1 to 6 percent, and consequently it has moderate to moderately rapid surface drainage (Fig. 5). Underdrainage is moderate. The small amount of organic matter which it contains is quickly dissipated following cultivation, and the soil tends to pack badly during heavy rainfall. Surface erosion thus becomes a problem, especially in fields left unprotected by a cover of vegetation during the winter and spring.

Use and Management.—Because Pecatonica silt loam is low in organic matter and subject to erosion when cultivated, it does not have a particularly high inherent productive level, and it deteriorates rapidly if heavily cropped. However, it responds to fertilizer treatment, and such treatment must be provided if it is to remain in a satisfactory state of production. Manure is always valuable as a fertilizer, but its full value is not realized if the soil is acid. A good crop rotation should be adopted which would include the frequent growing of clover or alfalfa, but these crops will not grow if the soil is too acid or will grow only very unsatisfactorily.

Proper use of limestone along with manure should provide for a relatively rapid increase in the nitrogen supply and the manure would also supply phosphorus and potash. Further applications of these two elements may prove profitable, especially for grain crops. In the absence of manure, legume crops with phosphorus and potash may be used. The carrying capacity of the permanent pastures located on this type of soil may likewise be increased by applications of limestone and manure and possibly by some phosphate or potash fertilizer in addition. The long gentle slopes can be cropped safely if fall plowing is avoided. If the steeper slopes with gradients of 3 to 6 percent are cultivated, they should receive additional protection such as strip cropping and contour farming offer.

Westville silt loam (22)

Westville silt loam is a light-colored soil that has developed from leached glacial till on strongly rolling topography under a deciduous forest vegetation. It occurs in association with Pecatonica silt loam, Type 21, and covers about 6 percent of the county, or 17.5 square miles.

The surface is a grayish-yellow silt loam low in organic matter and nitrogen and medium acid in reaction. It averages about 3 to 5 inches in thickness, tho in undisturbed forest areas it may be slightly thicker and the upper 2 or 3 inches may be a dark gray to a brownish gray. In intensively cultivated areas the entire surface horizon may already be lost thru erosion. The subsurface is 6 to 8 inches thick and is a grayish-yellow silt loam. The subsoil is 12 to 14 inches thick and is a reddish-yellow to yellow medium-plastic silty clay loam that breaks into $\frac{1}{4}$ - to $\frac{3}{4}$ -inch subangular aggregates. At a depth of 25 to 30 inches the subsoil grades into reddish-yellow medium-plastic leached clayey till which becomes more sandy and calcareous at a depth of 30 to 60 inches. The shallower depths do not represent the usual condition, tho in some areas the subsoil frequently grades directly into calcareous till; this is undoubtedly the result of erosion that occurred before the advent of man. A scattering of pebbles is usually noticeable on the surface and throughout the profile.

In Boone county Westville silt loam has developed on slopes ranging from 7 to 15 percent. Since these slopes provide rapid surface drainage, serious erosion results when they are carelessly farmed. Underdrainage is moderate.

Use and Management.—Westville silt loam is low in organic matter. When cultivated, it is subject to serious erosion. Tho its natural productivity level is low, it has a fair capacity to respond to good treatment. Its level of productivity for grain crops can never be as high as that of Pecantonica silt loam, Type 21.

because erosion is too severe during the periods of cultivation. For hay and pasture crops, however, the Westville type compares favorably with Pecatonica. All tillage operations should be on the contour, that is, across the slope instead of up and down; and if it is at all feasible, strip cropping should be practiced.



FIG. 6.—VIEW OF WESTVILLE SILT LOAM

This soil occurs on pronounced slopes and erodes badly if unprotected by vegetation. Its best use, as illustrated in this picture, is for pasture and timber.

This soil type should make good alfalfa land when soil acidity and plant-food deficiencies are corrected. Probably its best use is for permanent pasture or for timber (Fig. 6).

Miami silt loam (24)

Miami silt loam is a light-colored soil derived from a thin silty covering on calcareous glacial till. It is developed on gently rolling to rolling topography under a deciduous forest vegetation. It occupies, altogether, an area of about 15 square miles.

The surface horizon is generally 5 to 7 inches thick and is a yellowish-gray silt loam low in organic matter and medium acid in reaction. In undisturbed forest areas the upper 2 or 3 inches of soil is a dark gray to a brownish gray. The subsurface is a grayish-yellow silt loam 6 to 8 inches thick. The subsoil is 10 to 12 inches thick and is a brownish-yellow medium-plastic silty clay loam that breaks into $\frac{1}{4}$ - to $\frac{3}{4}$ -inch subangular aggregates. Pebbles are noticeable on the surface and thruout the profile, but they become particularly abundant in the lower subsoil. At a depth of 28 to 35 inches the material grades into permeable calcareous pebbly till.

Miami silt loam has developed on slopes ranging from about 2 to 6 percent. This amount of slope provides moderate to moderately rapid surface drainage (Fig. 7). Underdrainage is moderate.

Use and Management.—Miami silt loam is similar to Pecatonica silt loam, Type 21, but since the underlying till material, carrying large quantities of limestone, is considerably nearer the surface in Miami silt loam, Miami's potential

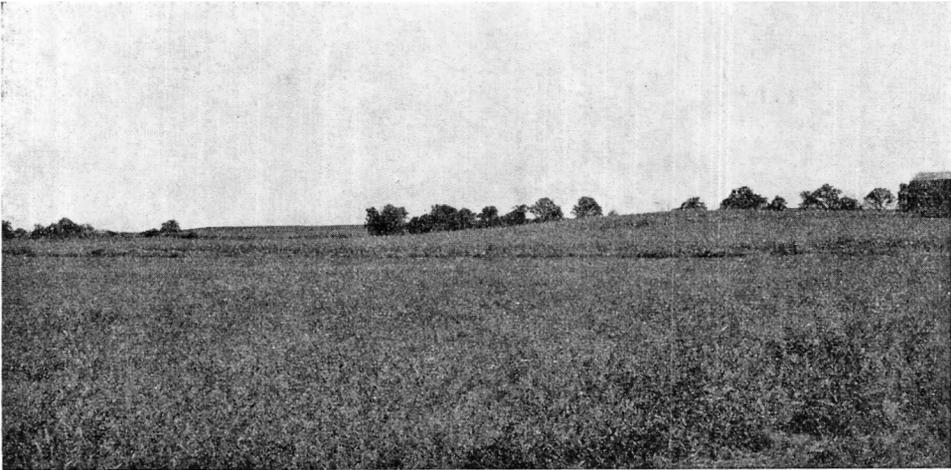


FIG. 7.—AN AREA OF MIAMI SILT LOAM IS SHOWN ON THE HIGHER LAND IN THE DISTANCE
Miami silt loam in Boone county is found on gently rolling topography. It occupies all told about 15 square miles and is good crop land when well farmed.

productivity level may be somewhat higher than that of Pecatonica, especially for legume crops. Otherwise the use and management recommendations for the two types are similar (see Pecatonica silt loam, Type 21, page 15).

Hennepin gravelly loam (25)

The total area of Hennepin gravelly loam in Boone county amounts to less than one square mile. It is generally confined to the steep stream bluffs and adjacent gullied land, but in this county it also includes thin, eroded spots and strips on the high morainal knobs and ridges which are to be found in various parts of the county.

Destructive erosion always follows removal of the natural vegetation either by forest cutting or by cultivation. In badly eroded areas a part of all of the soil horizons are absent, and the coarse, pebbly, or rocky, calcareous till is often exposed.

Use and Management.—Because Hennepin gravelly loam usually occurs on slopes of 25 percent or greater and is so easily damaged by erosion, its best use is in permanent pasture or timber. On areas already badly injured, the problem is to get some sort of protective vegetation started. Sweet clover and young locust trees are probably two of the most satisfactory plants for this purpose, tho there is sometimes considerable hazard in getting either of them started. After erosion has been checked, bluegrass can be seeded or permanent plantings of desirable forest trees can be made.

Dodgeville silt loam (40)

Dodgeville silt loam is a dark soil derived from a thin mantle of loess and glacial till, 40 inches thick or less, on limestone bedrock. It has developed on undulating to rolling topography under grass vegetation. It is of very minor importance in Boone county, amounting to only a quarter of a square mile. All the areas occur to the southwest of Belvidere within a few miles of Irene.

In those areas where the soil material is about 40 inches thick above the bedrock, the soil profile does not differ greatly from that of the surrounding Saybrook silt loam, Type 145. The surface is 6 to 8 inches thick and is a brown to light-brown silt loam medium in organic-matter content and medium acid in reaction. The subsurface is 6 to 10 inches thick and is a light-brown silt loam. The subsoil is 10 to 15 inches thick and is a brownish-yellow medium-plastic silty clay loam. Below the subsoil there is a variable thickness of silty, sandy, or pebbly material the upper part of which can usually be identified as being glacial till, while the lower part is broken and disintegrated limestone bedrock.

In those areas where the bedrock is less than 30 inches beneath the surface, underdrainage has been slightly impeded, with the result that all of the soil horizons exhibit a distinct gray cast and the subsoil tends to be slightly more plastic than in Saybrook silt loam.

Use and Management.—Quarrying of the underlying bedrock has been done in several places at one time or another. Some of the stone is only of fair quality, while other portions are of excellent quality and provide a future source of agricultural limestone. Since in the quarried areas the overlying soil has been stripped away, these areas are not now fit for agricultural use. Some restoration of these quarried areas to usefulness may be made by seeding sweet clover on them. Later, bluegrass will come in as a more permanent and desirable pasture crop.

The tillable portions of this soil type are subject to some sheet erosion, and should be protected against surface loss. Where the soil material overlying the bedrock is about 40 inches thick, response to fertilizers should be good, and treatment may be similar to that of Saybrook silt loam, Type 145. But where the overlying soil is less than 30 inches thick, the type is apt to be drouthy and is better adapted to the early, shallow-rooted crops such as oats, wheat, and hay or pasture, rather than to corn.

Muscatine silt loam (41)

Muscatine silt loam is a dark soil that has developed on undulating to gently rolling topography under a fairly heavy grass vegetation. It is generally a deep, loess-derived type, but in Boone county the silty mantle is variable, being not more than 30 to 35 inches thick in some places, while elsewhere it may be 50 inches or more in thickness. The shallow areas were included for the sake of map simplicity, since the total area in the county amounts to only 2.27 square miles.

The surface horizon is 7 to 10 inches thick and is a brown to light-brown silt loam medium to medium-high in organic-matter content and medium acid to

slightly acid in reaction. The subsurface is an 8- to 10-inch layer of yellowish-brown silt loam, while the subsoil is a 10- to 14-inch layer of light yellowish-brown slightly plastic silty clay loam that breaks into $\frac{1}{4}$ - to $\frac{3}{4}$ -inch subangular brownish-coated aggregates. Immediately below the subsoil the material is a grayish-yellow to yellow silt that varies from a few inches to several feet in thickness. Pebbles may occasionally be found in this silty material, especially where the stratum is thin. Reddish leached plastic till generally lies below this layer.

In this county the slope ranges from 1 to about 6 percent, which provides for moderate to moderately rapid surface drainage and gives opportunity for some erosion, especially on the steeper slopes. Underdrainage is moderate.

Use and Management.—Muscatine silt loam is one of the naturally more productive types of soil in Boone county. It is higher in organic matter and not quite so acid as the associated light-colored soils; therefore it produces consistently higher crop yields and also stands more abuse than do the surrounding upland types. It responds to good treatment, and where given good care it may be expected to produce excellent returns. A system of crop rotation is recommended which will include a diversity of crops. Under proper soil treatment alfalfa does well.

On those farms where sufficient livestock is kept, an application of manure should be made to all cropland once or twice during each rotation period and to the pastureland at convenient but regular intervals. On the grain farms a leguminous green-manure crop should be plowed under once every four or five years. On both livestock and grain farms phosphate or perhaps potash fertilizer may prove profitable if judiciously applied. Good results should be secured from tile, especially on land with slopes averaging less than 2 or 3 percent. Fall plowing should be avoided, particularly on slopes greater than 3 percent, and a cover crop should be allowed to remain on the land during the winter. Strip cropping or contour farming may be practiced to advantage on some slopes.

Caledonia silt loam (52)

Caledonia silt loam is a dark soil derived from silty wash material and developed on nearly level to depressional topography under heavy slough-grass vegetation. It is one of the more important soil types, occupying a total area of about 28 square miles in Boone county, or nearly 10 percent of the area of the county.

The surface is 8 to 10 inches thick and varies from a black silt loam to a silty clay loam. It is very high in organic matter, often approaching in this respect a peaty loam or muck. It is neutral to alkaline in reaction and is probably rather low in available potash. A few spots with a scattering of shell fragments are present. The subsurface is not definitely defined but tends to be more grayish and somewhat heavier than the surface. The subsoil is usually a dark-gray silty clay loam, often marked with yellowish spots. Below a depth of about 30 inches the material is some form of silty or sandy, mostly calcareous, wash.

In general, surface drainage varies from moderate to slow, while in a few ponded areas it is entirely lacking. Underdrainage is moderate; that is, ground water has no difficulty in reaching tile. However, some outlets are so poor that

the excess water may not drain away readily. This soil is not a bottomland type but, because it is so low-lying, water from adjacent higher land drains onto it during periods of heavy rainfall (Fig. 8).

Use and Management.—The most important factor in the improvement of Caledonia silt loam for agricultural purposes is drainage. In some areas tile alone, or possibly open ditches alone, will be sufficient; but for most of the larger

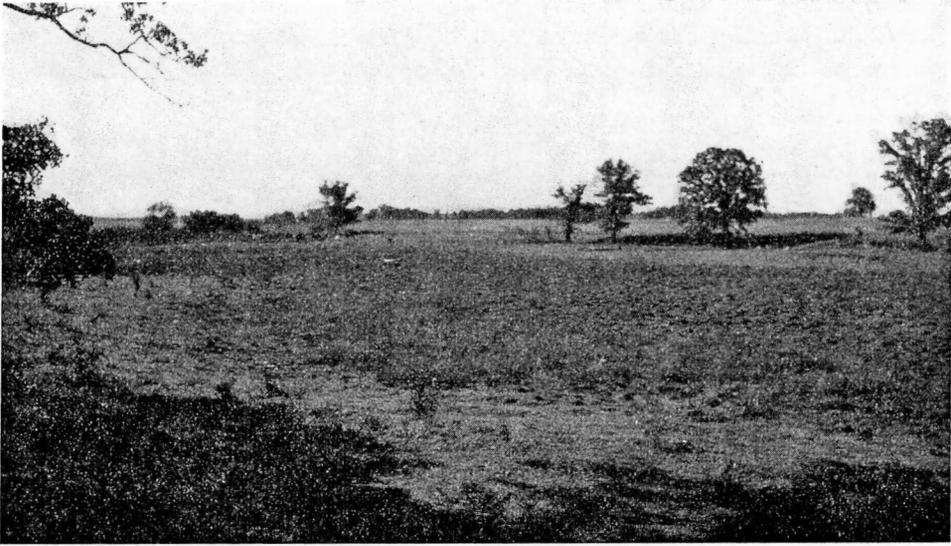


FIG. 8.—AN AREA OF CALEDONIA SILT LOAM

This is an extensive soil type in Boone county. Because of poor drainage it is used chiefly for pasture.

areas with poor outlets both open ditches and tile will be required in order to secure effective drainage. Following the establishment of good drainage many of the general farm crops can be grown successfully. In the more swampy areas, however, especially where the surface is abnormally high in organic matter or is highly alkaline, available potash and phosphorus may be deficient. Nitrogen is too high for efficient crop production; and unless a proper plant nutrient balance is established, vegetative growth is likely to be excessive. Corn especially will often benefit by the addition of potassium. As a cheap source of potassium, the straw of oats or of barley may be mentioned.

So far as is known at this time, limestone is not generally needed on Caledonia silt loam. A light application may be necessary in some instances in order to secure good sweet-clover growth, but this probably applies only in those areas that have been tilled for a long time. An occasional application of fresh manure may prove beneficial in helping to maintain good tilth, altho manure can usually be used to better advantage on soils lower in organic matter.

Lisbon silt loam (59)

Lisbon silt loam is a dark soil derived from thin loess or wash on permeable calcareous glacial till, and is developed on nearly level to undulating topography

under heavy grass vegetation. It is not an important type in Boone county, the total area amounting to only 2.55 square miles.

The surface horizon is 7 to 10 inches thick and is a dark-brown silt loam high in organic-matter content and neutral to slightly acid in reaction. The subsurface is 6 to 9 inches thick and is a drabbish-brown silt loam. The subsoil is 14 to 20 inches thick and is a brownish-yellow medium-plastic silty clay loam that breaks into $\frac{1}{4}$ - to $\frac{3}{4}$ -inch dark-coated aggregates. Below the subsoil there is sometimes a few inches of silty or sandy material, but permeable calcareous glacial till generally lies below a depth of 35 to 45 inches. The Lisbon type grades into Saybrook silt loam, Type 145, on one side, and into Caledonia silt

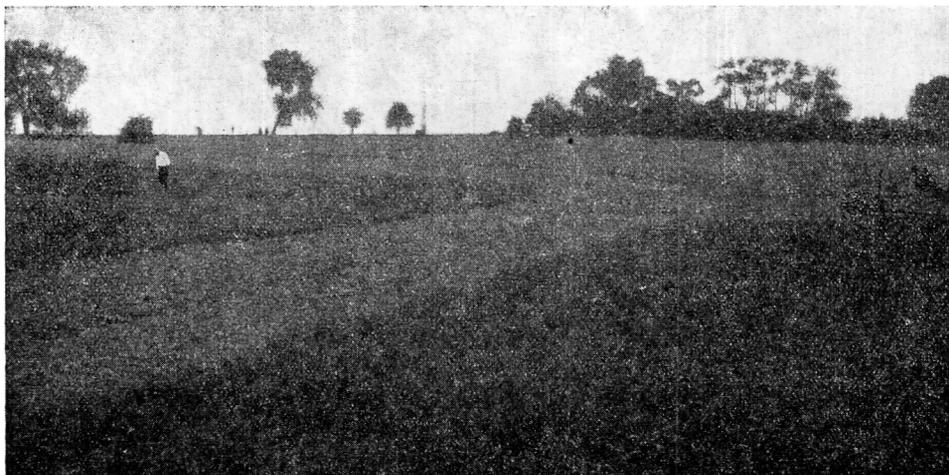


FIG. 9.—WELL-MANAGED LAROSE SILT LOAM

Mixed red clover and alfalfa have controlled erosion on these slopes, which have gradients varying from 6 to 8 percent.

loam, Type 52, on the other, and consequently at times it may include very small areas of either or both of these other types. Also, the separation of the Lisbon type from Brenton silt loam, Type 149, is not very distinct in some places.

Surface drainage is slow to moderate, and underdrainage is moderate. Drainage outlets for the most part are good.

Use and Management.—Lisbon silt loam is a very productive and easily cultivated soil. It responds to tile drainage and good treatment and requires only good farming practices to keep it in a state of high productivity for many years. A light application of limestone may be necessary in order to secure good stands of clover or alfalfa; and regular applications of manure will help to keep crop yields at a high level. If heavily farmed, a potash or a phosphate fertilizer may eventually prove of value.

LaRose silt loam (60)

LaRose silt loam is a medium-dark soil derived from permeable calcareous till and has developed on strongly rolling topography under prairie vegetation. It occupies a total area of 3.18 square miles in the southern part of the county.

The surface is a light-brown silt loam that varies from 0 to 6 inches in thickness, depending on erosion. It is medium to low in organic-matter content and medium acid in reaction. The subsurface is generally about 4 to 7 inches thick and is a brownish-yellow silt loam, which also may be partially lost by erosion. The subsoil is generally 12 to 16 inches thick and is a brownish-yellow to reddish-brown slightly plastic silty clay loam that breaks into indistinct $\frac{1}{4}$ - to $\frac{3}{4}$ -inch subangular aggregates. A few pebbles are commonly scattered over the surface and thruout the profile. In uneroded areas the underlying permeable calcareous till usually occurs at a depth of 30 to 40 inches; but where severe erosion has removed a large portion of the upper soil horizons, the underlying till may be only 20 to 25 inches beneath the surface of the land.

Since LaRose silt loam has developed on slopes ranging from 6 to 15 percent, surface runoff is rapid. Underdrainage is moderate.

Use and Management.—Improving the productivity of LaRose silt loam is probably the best way to protect it against erosion. The manure-limestone-legume treatment is suggested as the best way to bring about this improvement. Regular use of the biennial clovers or of alfalfa is especially important, since they provide a winter cover (Fig. 9). Fall plowing should be avoided. This soil type is very good as permanent pastureland.

Herbert silt loam (62)

Herbert silt loam is a medium-dark soil derived from permeable calcareous till and developed on undulating to rolling topography under grass and scattered timber known as park vegetation. It occupies an area of about 6 square miles, or slightly more than 2 percent of the total area of the county.

The surface horizon is 5 to 7 inches thick and is generally a grayish-brown silt loam medium in organic-matter content and medium acid in reaction. When moist the surface appears to be brown, but when dry the gray cast is very distinct. The subsurface is 5 to 8 inches thick and is a yellowish-brown to yellowish-gray silt loam. The difference in color may be due partly to variation in percent of slope, but mostly to degree of timbering. The subsoil is 12 to 14 inches thick and is a brownish-yellow medium-plastic silty clay loam that breaks into $\frac{1}{4}$ - to $\frac{3}{4}$ -inch subangular dark-coated aggregates. The coatings appear rather gray when the soil is dry. Sometimes a few inches of mixed silty or sandy material lies directly beneath the subsoil, but permeable calcareous till usually lies below 30 to 40 inches. A few pebbles may be scattered over the surface and thruout the profile.

The slopes on which this soil occurs vary from about 1 to 6 percent. Surface drainage is moderate to moderately rapid, and erosion is a serious problem only on the steeper slopes. Underdrainage is moderate.

Use and Management.—The surface horizon of Herbert silt loam is somewhat higher in organic-matter content than that of Pecatonica silt loam, Type 21, but the fertilizer requirements are about the same. Drainage and erosion problems and various management practices also are similar (see Pecatonica silt loam, Type 21, page 15).

O'Neill sandy loam, terrace (63)

O'Neill sandy loam, terrace, is a medium-dark soil derived from alluvial sandy material and developed on nearly level to gently rolling topography under a grass vegetation. In Boone county it occupies 2.84 square miles.

The surface horizon is 6 to 7 inches thick and varies from light-brown to dark-brown sandy loam low to medium in organic-matter content and medium acid in reaction. The subsurface is 6 to 9 inches thick and is a light-brown to brownish-gray sandy loam. The subsoil varies from 6 to 12 inches in thickness and is a brownish-yellow to grayish-yellow slightly plastic sandy loam. At a depth of 20 to 35 inches the subsoil grades into incoherent stratified sand and gravel. Surface drainage is moderate, but underdrainage is very rapid, and the type tends to be drouthy.

Use and Management.—Because of its sandy nature and drouthy tendency, O'Neill sandy loam, terrace, makes a poor general agricultural soil. It is, however, adapted to spring grains, early pasture, and timber. Fertilizer applications are probably seldom justified, as the yields of such crops as corn are seriously reduced by a failing moisture supply at the critical period of crop growth. Perhaps, in a few instances, the manure-limestone-legume treatment will give sufficient response to be advisable. Some areas have a relatively high water table, and this helps to carry crops over prolonged rainless periods; but for the most part the water table fluctuates too widely to be of material help during such rainless periods. A lowering of the water table would cause many areas now producing fair crops to become worthless for those crops.

Where the underlying sandy-gravelly material is several feet thick and relatively clean, it makes a good source of commercial sand and gravel.

Otter loam, bottom (76)

Otter loam, bottom, is a dark soil derived from stream alluvium and developed under swamp vegetation. It occupies the bottoms of the major streams in Boone county and covers an area of 16.3 square miles.

Because it occurs in the stream valleys and is subject to periodic covering by stream sediment, there has been no definite profile development. The surface is of varying thickness but is generally a dark brown to black silt loam or sandy loam, often mucky, and very high in organic matter. It is neutral to alkaline in reaction. The subsurface and subsoil are not well defined. They vary in color from black to gray or yellowish and in texture from a mixed silt loam or clay loam to sand or gravel. Sand and gravel materials are frequently present at a depth of 20 to 40 inches. Surface drainage is slow and underdrainage is moderate to rapid, but outlets are poor. Consequently the water table is high, and much of the type is wet and swampy.

Some of the Otter loam in the bottomland along the lower part of Beaver creek is better drained than the rest. The surface is browner and there are fewer mucky areas, but separation into a different type was not made because the area is not extensive. This phase, however, should be more readily tilled than most of the other bottoms.

Use and Management.—Most Otter loam, bottom, is in pasture at the present time, and this is probably its best use since the water table is high and outlets are too poor to provide adequate drainage for satisfactory tillage operations



FIG. 10.—AN AREA OF OTTER LOAM, BOTTOM

This is the only soil type in Boone county mapped as bottomland. It is found along the Kishwaukee and its tributaries. Altho most of the areas are too wet to cultivate, they furnish good pasture.

Fig. 10). Where drainage is not too poor, however, the type is adapted to summer crops.

In the past, some of the underlying material has been used for road gravel. Perhaps other uses may create a future demand for this material.

O'Neill silt loam, terrace (79)

O'Neill silt loam, terrace, is a medium-dark soil derived from a thin silt covering on coarse, loose, stratified sand and gravel and developed under grass vegetation. It occupies an area of 11.24 square miles in Boone county, bordering the Kishwaukee valley.

The surface horizon is 6 to 8 inches thick and is a brown to light-brown silt loam or sandy silt loam medium in organic-matter content and medium-acid in reaction. The subsurface is 6 to 8 inches thick and is a light-brown to brownish-yellow silt loam varying to a sandy silt loam. The subsoil is 6 to 12 inches thick and is a yellowish-brown to reddish-yellow slightly plastic clayey silt loam with some sand or gravel, especially in the lower part. At a depth of 25 to 35 inches the subsoil grades into coarse incoherent stratified sand and gravel.

Surface drainage varies from slow to moderate, but underdrainage is rapid. This soil is drouthy unless the water table is high. In some portions of the large O'Neill area west of Belvidere on the borderline between this type and Littleton silt loam, terrace, Type 81, the underlying loose sand and gravel occurs at a depth of 36 to 38 inches. These areas where the sand and gravel are deeper than is

common for O'Neill silt loam are not so drouthy as are those where the sand and gravel occurs at a depth of 30 inches or less and their producing capacity is somewhat higher. The area, as a whole, however, tends more toward drouthiness and lower productivity than does Littleton silt loam, terrace, and the profile characteristics resemble O'Neill more than they do Littleton.

A few areas of O'Neill silt loam are low-lying and are subject to overflow during periods of high water. These areas usually have a high water table, which makes them less drouthy than is common for the type.

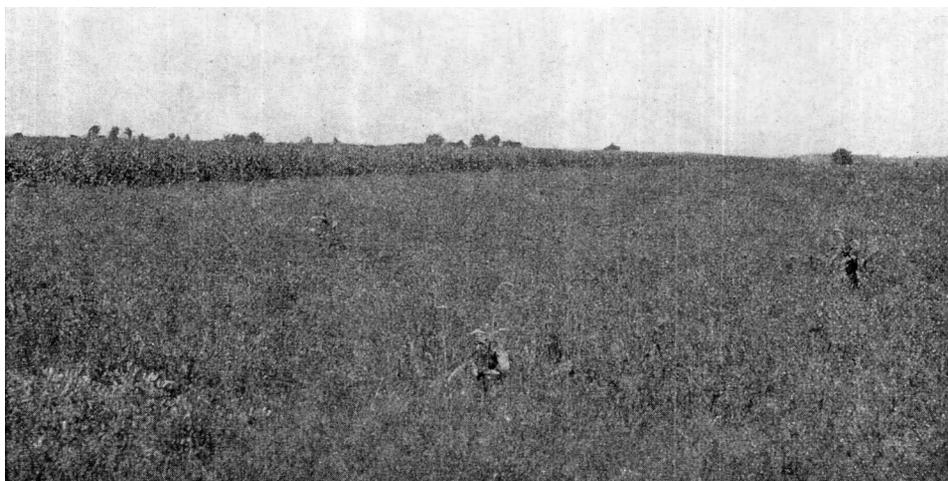


FIG. 11.—AN EXPANSE OF O'NEILL SILT LOAM, TERRACE

The large level-lying terrace bordering the Kishwaukee bottom southwest of Belvidere is underlain by coarse sand and gravel, making it somewhat drouthy. It is better adapted to small grain than to corn, and it produces good alfalfa if limed.

Use and Management.—O'Neill silt loam, terrace, is better adapted to winter and early spring grains or deep-rooted legumes than to corn. Alfalfa requires some limestone, but once its roots are down and the plants are well established, it produces fairly good yields on this soil. Manure is always valuable as a fertilizer, but its full value is not realized so long as the soil is acid. Tho fertilizers are important, the drouthy tendencies of this soil always remain a hazard and must be considered in any soil-treatment program on this land (Fig. 11). The underlying sand and gravel may have some commercial value.

Littleton silt loam, terrace (81)

Littleton silt loam, terrace, is a dark soil derived from silty alluvial material 40 inches or more thick lying over stratified sand and gravel. It has been developed on nearly level to undulating topography under grass vegetation. It occupies an area of 12.09 square miles in Boone county, lying chiefly within Piskasaw creek valley.

The surface horizon is 7 to 10 inches thick and is a brown to dark-brown silt loam moderately high in organic matter and medium to slightly acid in reaction. The subsurface is 5 to 8 inches thick, and is a light-brown to yellowish-

brown silt loam. The subsoil is 10 to 14 inches thick and is brownish yellow to gray with yellow spots. It is a slightly plastic silty clay loam that breaks into indistinctly subangular aggregates. A few inches to several feet of mixed gray and yellow silt or sandy silt usually lies below the subsoil, and below this silt, stratified sand and gravel often extends to a depth of 45 or 50 inches. Small areas sometimes occur in which the underlying coarser sand and gravel occurs at a depth of only 38 to 40 inches. The soil profile in these areas resembles that of O'Neill silt loam, terrace, Type 79.

Surface drainage is slow to moderate, while underdrainage is moderate and outlets are usually good.

Use and Management.—Littleton silt loam, terrace, is generally not drouthy, nor is it greatly harmed by erosion. It is a fertile soil and is adapted to all vegetable, grain, and legume crops grown in the region, tho some limestone is usually necessary before alfalfa or sweet clover will do well. The soil-treatment and management practices suitable for this soil are the same as those suggested for Muscatine silt loam, Type 41 (page 19).

Muck (103)

Muck is of rather minor importance in Boone county, covering only 1.26 square miles. It has developed on poorly drained swampy flats or in basin-like depressions where, under natural conditions, a high water table prevails thruout the year. In some areas the surface is covered by small hummocks.

No profile development has taken place, and no definite horizon separations can be made. The surface material is a mixture of organic matter and silt or clay, which may vary in thickness from a few inches to several feet, depending on variations in natural drainage and the preservation of plant remains. It is brown to black in color, neutral to alkaline in reaction, and likely to be low in available potash. If the surface material is less than 2 feet thick, the underlying mixture of clay or silt may serve as a subsoil. Often below 30 to 35 inches the material is calcareous sand or sandy silt.

Some portions of this type could be classed as peaty muck or peat. The three largest of these areas are: (1) Northeast part of Section 25, Township 46 North, Range 4 East. This area is mostly covered with water and is of no agricultural value at this time. Its margins are all in permanent pasture. (2) Northwest part of Section 1, Township 45 North, Range 4 East. This area is drained and is now under cultivation. (3) Southwest part of Section 10, Township 45 North, Range 4 East. Altho not definitely under water at this time, the area has a water table that is too high for satisfactory tillage operations, and consequently is all in pasture.

Natural surface drainage for all peat and muck areas is slow, and altho underdrainage is moderate to rapid, outlets are often poor.

Use and Management.—Undrained areas of peat and muck are adapted only to permanent pasture, but when drained they may be used for such summer crops as vegetables, corn, and tame hay. The Illinois Experiment Station found that potatoes grown on deep peat in Whiteside county gave large increases after potash fertilizer or straw was applied to the soil. The Wisconsin and Minnesota

Stations have found that fertilizers high in phosphorus and potassium have increased the yields of all crops adapted to deep peat. Results from both these stations indicate that reed canary grass does well as a hay crop on peat land but that a phosphate-potash fertilizer is usually necessary in order to secure maximum returns.

Camden silt loam, terrace (134)

Camden silt loam, terrace, is a light-colored soil derived from silty alluvial material 35 to 40 inches or more in thickness over stratified sand and gravel and developed on nearly level to undulating topography under deciduous forest vegetation. It occupies 4.39 square miles in Boone county.

The surface horizon is 5 to 7 inches thick and is a grayish-yellow silt loam low in organic-matter content and medium acid in reaction. In undisturbed forested areas the upper 2 or 3 inches of soil is dark gray or brownish gray and contain a small amount of organic matter, which rapidly disappears with cultivation. The subsurface is 6 to 8 inches thick and is a light grayish-yellow silt loam. The subsoil is 8 to 14 inches thick and is a yellow to reddish-yellow slightly plastic silty clay loam. Sometimes the subsoil grades directly into sandy pebbly terrace material, but more often it grades into friable silty material that extends to a depth of 40 inches or lower, and below which lies stratified sand and gravel.

Surface drainage is moderate or sometimes moderately slow, and under-drainage is moderate.

Use and Management.—The recommendations given for Pecatonica silt loam, Type 21, apply also to Camden silt loam, terrace (see page 15).

Ellison silt loam, terrace (137)

Ellison silt loam, terrace, is a light-colored soil derived from a thin silt covering on coarse, loose, stratified sand and gravel and developed under deciduous forest vegetation. It occupies an area of only 1.63 square miles in Boone county.

The surface horizon is 5 to 7 inches thick and is a grayish-yellow silt loam to sandy silt loam low in organic-matter content and medium acid in reaction. In undisturbed forested areas the upper 2 or 3 inches of soil is dark gray and contains a small amount of organic matter that decays rapidly following cultivation. The subsurface is 5 to 8 inches thick and is a light grayish-yellow silt loam. The subsoil is 7 to 12 inches thick and is a yellow or reddish-yellow slightly plastic silty clay loam. The lower part of the subsoil usually contains some pebbles, and at a depth of 20 to 35 inches it grades rather sharply into the loose stratified sand and gravel.

Surface drainage is usually moderate. Underdrainage is rapid, and where the water table is low the soil is drouthy.

Use and Management.—The supply of organic matter is lower in Ellison silt loam, terrace, than it is in O'Neill silt loam, terrace, Type 79, but in general the recommendations given for that type also apply to this Ellison soil (see page 25).

Saybrook silt loam (145)

Saybrook silt loam is a dark soil derived from permeable calcareous glacial till and developed on gently rolling to rolling topography under grass vegetation.

It occupies an area of 47.55 square miles in Boone county and is found mainly in the southern half of the county (Fig. 12).

The surface horizon is 5 to 7 inches thick and is a brown silt loam medium to medium-high in organic-matter content and medium acid in reaction. The subsurface is 6 to 10 inches thick and is a light-brown or yellowish-brown silt loam. The subsoil is 8 to 12 inches thick and is a brownish-yellow slightly plastic silty clay loam that breaks into $\frac{1}{4}$ - to $\frac{3}{4}$ -inch subangular aggregates. A faint



FIG. 12.—SAYBROOK SILT LOAM AS PASTURE

This is a typical view of the second most extensive soil type in Boone county, Saybrook silt loam. It is one of the better soils but is subject to erosion on the steeper slopes.

grayish coating is noticeable on the cleavage faces, particularly when the soil is dry. Below the subsoil there are usually a few inches of silty or pebbly material that grades at a depth of 35 to 40 inches into friable calcareous till.

On the ridge north of Garden Prairie a few small spots of more plastic till material occur. Underdrainage is somewhat slower in these spots. Small areas of very sandy till occasionally occur thruout the Saybrook region, and underdrainage is somewhat more rapid in these places. In general, however, surface drainage is moderate to moderately rapid, and underdrainage is moderate. Harmful erosion occurs thruout the type, particularly on slopes greater than 3 or 4 percent.

Use and Management.—The recommendations given for Muscatine silt loam, Type 41, also apply to Saybrook silt loam (see page 19).

Proctor silt loam (148)

Proctor silt loam is a medium-dark soil derived from a silty covering 35 to 40 inches or more in thickness lying over sandy glacial outwash material and developed on gently rolling to rolling topography under grass vegetation. It occupies an area of 2.68 square miles in Boone county.

The surface is 6 to 8 inches thick and is a brown to light-brown silt loam medium in organic-matter content and medium acid in reaction. The subsurface

is 5 to 8 inches thick and is a yellowish-brown to brownish-yellow silt loam. The subsoil is 8 to 12 inches thick and is a brownish-yellow slightly plastic silty clay loam that breaks into indistinctly subangular aggregates. Normally a few to several inches of yellowish silty material lies below the subsoil. At a depth of 35 inches or more this stratum grades into loose sandy material. In Boone county, however, there are included with this type a few areas in which the incoherent sandy material lies at a depth of only 25 to 30 inches. At the present time these areas have a relatively high water table so that they are not particularly drouthy.

Surface drainage is moderate, and underdrainage is moderate to moderately rapid. Erosion is not serious, for the most part, and the type is fairly resistant to drouth.

Use and Management.—Except that Proctor silt loam is somewhat lower in organic matter than Muscatine silt loam and may give greater response to large amounts of manure, the treatments recommended for Muscatine silt loam, Type 41, apply to this type also (see page 19).

Brenton silt loam (149)

Brenton silt loam is a dark soil derived from 40 inches or more of silty material on sandy glacial outwash and developed on nearly level to undulating

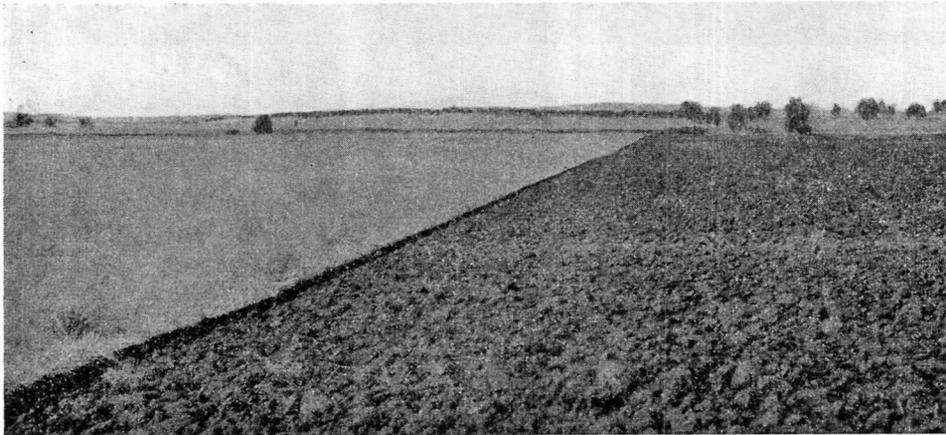


FIG. 13.—TYPICAL FARM LANDSCAPE IN BOONE COUNTY

Four soil types are included in this picture. Brenton silt loam and Saybrook silt loam are in the foreground; LaRose silt loam and Strawn silt loam are on the ridge in the background.

topography under heavy grass vegetation. It occupies an area of 6.39 square miles in Boone county.

The surface is 8 to 10 inches thick and is a dark-brown silt loam high in organic-matter content and neutral or only slightly acid in reaction. The sub-surface is 6 to 9 inches thick and varies from a yellowish-brown silty clay loam to brownish-gray silt loam. The subsoil is 9 to 16 inches thick and is a yellowish-to grayish-brown medium-plastic silty clay loam that breaks into $\frac{1}{4}$ - to $\frac{3}{4}$ -inch

dark-gray-coated subangular aggregates. Alluvial silty material lies beneath the subsoil. This may change to sandy silt or sand below 40 to 45 inches.

In places where the wash material is thin and the calcareous till relatively shallow, there has been some intermixing of this type with Lisbon silt loam, Type 59. In other places where this type borders Caledonia silt loam, Type 52, or Capron silt loam, Type 226, there is some inclusion of those types.

Slopes range up to about 1 percent, and surface drainage is moderately slow. Underdrainage is moderate, and tile outlets are generally only fair to poor. Some dredging may be necessary to provide good drainage for many areas of this type (Fig. 13).

Use and Management.—The treatment recommended for Lisbon silt loam, Type 59, also applies to Brenton silt loam (see page 21).

Onarga sandy loam (150)

Onarga sandy loam is a medium-dark soil, derived from mixed wind-blown sand and sandy outwash material and developed on undulating to rolling topography under grass vegetation. The type is of very minor importance in Boone county, occupying a total area of only .51 square mile.

The surface is 4 to 6 inches thick and is a brown to light-brown sandy loam medium low in organic-matter content and medium acid in reaction. The subsurface is 6 to 8 inches thick and is a yellowish loose sand or loamy sand. The subsoil is 8 to 12 inches thick and is a yellow to reddish-yellow permeable sandy loam to fine sandy loam with some coherence. Below 30 to 35 inches the material is mostly incoherent yellowish sand, tho a few areas were included in the survey in which calcareous till occurs at a depth of 35 to 45 inches.

Slopes vary from 1 to about 5 percent, and surface drainage is moderate to moderately rapid. Underdrainage is moderate to rapid. The lighter, thinner portions of the type tend to be drouthy, particularly if heavily cropped. The rolling, lighter portions are also subject to wind erosion when not covered by vegetation.

Use and Management.—Results from the Oquawka experiment field show that open, sandy soils such as Onarga sandy loam represents respond to limestone, legumes, and manure, but unless well-farmed they deteriorate rapidly. It is advisable either to use a short rotation in which a legume is included, or else to make frequent and relatively heavy applications of barnyard manure. Deep-rooted legumes, particularly alfalfa, do well after the acidity of the soil has been corrected.

Miami sandy loam (205)

Miami sandy loam is a light-colored soil derived from sandy glacial material and developed on undulating to rolling topography under forest vegetation. It is a very minor type in Boone county, covering only .44 square mile.

The surface is 5 to 7 inches thick and is a yellowish-gray sandy loam low in organic-matter content and medium acid in reaction. In undisturbed forested areas, the upper 2- or 3-inch layer contains a small amount of organic matter and is dark gray or brownish gray in color. The subsurface is 6 to 8 inches thick and has a pale grayish-yellow color. The subsoil is variable in thickness but

usually averages around 8 to 12 inches. It is yellow to reddish yellow in color and is a slightly plastic sandy clay loam, usually containing a few pebbles that become more numerous in the lower part. At a depth of 28 to 30 inches the subsoil grades into pebbly, sandy till that usually becomes calcareous between 40 to 50 inches beneath the surface.

The slopes on which this soil occurs vary from 1 to about 5 percent, and surface drainage is moderate to moderately rapid. Underdrainage is moderate to rapid. The more rolling portions tend to be drouthy and if not protected by vegetation will sometimes drift somewhat in heavy winds.

Use and Management.—Miami sandy loam is naturally somewhat lower in organic matter than Onarga sandy loam, Type 150, but the recommended treatment and management practices are the same (see page 31).

Strawn silt loam (224)

Strawn silt loam is a light-colored soil derived from permeable calcareous glacial till and developed on strongly rolling topography under forest vegetation. It occupies a total area of 1.74 square miles in Boone county.

The surface horizon is 3 to 5 inches thick and is a grayish-yellow silt loam to sandy silt loam low in organic-matter content and medium acid in reaction. In undisturbed forested areas this horizon may be slightly thicker and the upper 1 or 2 inches are brownish gray in color. The subsurface is 4 to 7 inches thick and is a grayish-yellow silt loam. The subsoil is 10 to 14 inches thick and is a yellow to reddish-yellow slightly plastic silty clay loam. Pebbles occur thruout the profile and in places they are scattered over the surface.

The subsoil may grade directly into permeable calcareous till at a depth of 20 to 25 inches, but more often the upper portion of the till has been leached and is not now calcareous until a depth of 30 to 40 inches is reached. Frequent sandy pockets occur in the till, which in part account for variations in depth of leaching. Erosion is also responsible for some of the variations in depth to carbonates.

The slopes upon which this soil occurs range from about 7 to 15 percent, and surface drainage is rapid. Underdrainage is moderate. Severe sheet erosion and some gullyng are found thruout the type, particularly following cultivation.

Use and Management.—The recommendations given for Westville silt loam, Type 22, apply also to Strawn silt loam (see page 16).

Beaver silt loam (225)

Beaver silt loam is a medium-dark soil derived from a silty covering on leached pebbly till and developed on undulating to rolling topography under park vegetation; that is to say, under grass and scattered timber. It occupies an area of 6.52 square miles in Boone county.

The surface horizon is 5 to 7 inches thick and is a brown to light-brown silt loam with a distinct grayish cast when dry. It is medium in organic-matter content and medium acid in reaction. The subsurface is 8 to 10 inches thick and is a brownish-yellow silt loam that is distinctly grayish when dry. The subsoil is 12 to 15 inches thick and is a brownish-yellow medium-plastic silty clay loam that breaks into $\frac{1}{4}$ - to $\frac{3}{4}$ -inch subangular gray-coated aggregates. At 25 to 30 inches

the subsoil may grade directly into brownish plastic pebbly leached till that becomes calcareous at a depth of 60 to 90 inches, or it may first grade into a layer of yellowish silt of varying thickness which lies on top of the leached till; this latter condition is commonly prevalent wherever this type levels off into lower land to border Capron silt loam, Type 226.

The slopes on which Beaver silt loam occurs vary from 1 to about 6 percent. Surface drainage is moderate to moderately rapid, and underdrainage is moderate. Erosion is somewhat harmful, especially on slopes greater than 3 percent, but is not difficult to control. Artificial drainage is desirable on land averaging less than 3 percent slope.

Use and Management.—The recommendations given for Pecatonica silt loam, Type 21, apply also to Beaver silt loam (see page 15).

Capron silt loam (226)

Capron silt loam is a medium-dark soil derived from a silty wash material and developed on nearly level to depressional topography under a vegetation of mixed grass and brushy timber. It occupies an area of 19.23 square miles in Boone county, which is 6.86 percent of the total area of the county.

The surface horizon is 6 to 8 inches thick and is a grayish-brown silt loam medium in organic-matter content and medium to slightly acid in reaction. When moist, this layer is brown in color, but when dry, it carries a distinct gray cast. The sharply defined subsurface is 10 to 12 inches thick and is a gray or brownish-gray silt loam. The subsoil is 10 to 15 inches thick and is a dark-gray medium-plastic silty clay loam that is often spotted with yellow and breaks into $\frac{1}{4}$ - to $\frac{3}{4}$ -inch dark-coated subangular aggregates. At 28 to 32 inches the subsoil grades into silty wash that usually becomes calcareous at about 75 inches beneath the surface.

In a few small areas included with this type the surface is gray and the underlying parent material is rather sandy. Other minor variations and gradations into adjoining types also occur.

The slopes on which this soil occurs range up to about 1 percent and surface drainage is slow. Underdrainage is moderate but outlets are often rather poor.

Use and Management.—The introduction of good drainage is the first step in the improvement of Capron silt loam. Following drainage, a test should be made for acidity, and if need for limestone is indicated, it should be applied in amounts suggested by the test. Available phosphorus and potassium may or may not be low, and it is suggested that tests be made for them. One method of determining the need for certain plant-food constituents is to cover a small area with a fertilizer known to be high in one or more of those constituents and compare the results with results from adjoining untreated areas of the same soil type. It should be borne in mind, however, that results from a single season may be misleading. Manure or other fresh organic matter should be supplied at regular intervals.

Argyle silt loam (227)

Argyle silt loam is a medium-dark soil derived from a thin silty covering on leached till and developed on strongly rolling topography under mixed grass and

brushy forest vegetation. It occupies an area of 2.16 square miles in Boone county.

The surface horizon is 3 to 5 inches thick and is a light-brown silt loam relatively low in organic-matter content and medium acid in reaction. The sub-surface is 5 to 7 inches thick and is a brownish-yellow silt loam. The subsoil is 8 to 12 inches thick and is a brownish-yellow to reddish-yellow slightly plastic silty clay loam. A few pebbles may be scattered over the surface and thruout the profile. Leached plastic pebbly till occurs below a depth of 30 to 40 inches. At 60 to 70 inches beneath the surface the material is usually calcareous and more friable than that above.

The slopes on which this soil occurs range from 7 to 12 percent. Surface drainage is rapid, and erosion is a serious problem. Underdrainage is moderate.

Use and Management.—The recommendations given for Westville silt loam, Type 22, apply also to Argyle silt loam (see page 16).

SUMMARY OF CHARACTERISTICS OF BOONE COUNTY SOILS

The agriculturally more important characteristics and properties of the soil types occurring in Boone county are summarized in Table 2. Topography, drainage, reaction with respect to acidity, the contents of organic matter and of available phosphorus, all are indicated, together with an index of the inherent productivity of each type whether used for field crops, for pasture, or for forest.

A large majority of the soil types in this county it will be noted are medium acid, therefore in need of limestone. Some of them are also low in phosphorus as well as in organic matter.

The information in this table should not be taken to mean that every farm or field of a given soil type will necessarily exhibit the same characteristics as indicated here. As already pointed out, acidity and productivity may vary markedly within areas of the same type. For that reason, where there is doubt, each field should be tested as recommended in the more detailed discussion of the type, and treatments should be based on such test or tests.

TABLE 2.—BOONE COUNTY SOILS: SUMMARY OF CHARACTERISTICS

Type No.	Type name	See page ¹	Topography ²	Drainage ³		Reaction	Available phosphorus	Organic matter	Productivity indexes ⁴		
				Surface	Under				Field crops	Pas-ture	Forest
21	Pecatonica silt loam.....	15	Undulating to rolling	Moderate to rapid	Moderate	Medium acid	Low	Low	5	A	A
22	Westville silt loam.....	16	Strongly rolling	Rapid	Moderate	Medium acid	Low	Low	7	B	A
24	Miami silt loam.....	17	Undulating to rolling	Moderate to rapid	Moderate	Medium acid	Low	Low	5	A	A
25	Hennepin gravelly loam.....	18	Steep	Very rapid	.....	.....	.....	Low	10	C	B
40	Dodgeville silt loam.....	19	Undulating to rolling	Moderate to rapid	Moderate to slow	Medium acid	.....	Medium	5-10	B	B
41	Muscatine silt loam.....	19	Undulating to gently rolling	Moderate to rapid	Moderate	Medium acid	.....	Medium high	2	..	..
52	Caledonia silt loam.....	20	Nearly level or depressiona	Slow	Moderate	Neutral to alkaline	.....	Very high	2-5	..	..
59	Lisbon silt loam.....	21	Nearly level to undulating	Slow to moderate	Moderate	Slightly acid	.....	High	1-2	..	..
60	LaRose silt loam.....	22	Strongly rolling	Rapid	Moderate	Medium acid	.....	Medium	5	B	A
62	Herbert silt loam.....	23	Undulating to rolling	Moderate to rapid	Moderate	Medium acid	.....	Medium	4	..	..
63	O'Neill sandy loam, terrace...	24	Nearly level to gently rolling	Moderate	Rapid	Medium acid	.....	Medium	8	C	B
76	Otter loam, bottom.....	24	Nearly level to undulating	Slow	Moderate	Neutral	.....	High	5-10	A	B
79	O'Neill silt loam, terrace...	25	Nearly level to gently rolling	Slow to moderate	Rapid	Medium acid	.....	Medium	5-7	B	B
81	Littleton silt loam, terrace...	26	Nearly level to undulating	Slow to moderate	Moderate	Slightly acid	.....	High	2-3	..	..
103	Muck.....	27	Nearly level to depressiona	Slow	Moderate to rapid	Neutral to alkaline	.....	Very high	5-10	A	C
134	Camden silt loam, terrace....	28	Nearly level to undulating	Slow to moderate	Moderate	Medium acid	Low	Low	5	A	A
137	Ellison silt loam, terrace.....	28	Nearly level to undulating	Slow to moderate	Rapid	Acid	Low	Low	9	C	B
145	Saybrook silt loam.....	28	Gently rolling to rolling	Moderate to rapid	Moderate	Medium acid	.....	Medium high	3	..	..
148	Proctor silt loam.....	29	Gently rolling	Moderate	Moderate	Medium acid	.....	Medium high	3-4	..	..
149	Brenton silt loam.....	30	Nearly level to undulating	Slow to moderate	Moderate	Slightly acid	.....	High	2-3	..	..
150	Onarga sandy loam.....	31	Undulating to rolling	Moderate	Moderate to rapid	Medium acid	.....	Medium low	6	B	A
205	Miami sandy loam.....	31	Undulating to rolling	Moderate to rapid	Moderate	Acid	Low	Low	6	B	A
224	Strawn silt loam.....	32	Strongly rolling	Rapid	Moderate	Medium acid	Low	Low	7	B	A
225	Beaver silt loam.....	32	Undulating to rolling	Rapid	Moderate	Medium acid	.....	Medium	4	..	..
226	Capron silt loam.....	33	Nearly level	Slow	Moderate	Medium acid	.....	Medium to low	4	..	..
227	Argyle silt loam.....	33	Strongly rolling	Rapid	Moderate	Medium acid	.....	Medium	5-6	B	A

¹For description of soil type turn to page indicated.

²Topography is expressed by the following terms based upon the respective slopes: *nearly level*, less than .5 percent slope; *undulating*, .5 to 1.5 percent; *gently rolling*, 1.5 to 3.5 percent; *rolling*, 3.5 to 7 percent; *strongly rolling*, 7 to 15 percent; *steep*, greater than 15 percent.

³Of the terms used to express character of drainage, *moderate* indicates the most desirable drainage.

⁴The index number assigned to a soil type for production of field crops is based on the ability of the type to produce the major crops grown in the region, without soil treatment but with the soil in a cleared and drained condition. The scale used is 1 to 10, the *most productive soil* in the state being rated as 1 and the *least productive* as 10. The indexes for pasture and forest are expressed by the letters A, B, and C, A representing the best and C the poorest.

SOIL REPORTS PUBLISHED

1 Clay, 1911	34 Marion, 1926
2 Moultrie, 1911	35 Will, 1926
3 Hardin, 1912	36 Woodford, 1927
4 Sangamon, 1912	37 Lee, 1927
5 LaSalle, 1913	38 Ogle, 1927
6 Knox, 1913	39 Logan, 1927
7 McDonough, 1913	40 Whiteside, 1928
8 Bond, 1913	41 Henry, 1928
9 Lake, 1915	42 Morgan, 1928
10 McLean, 1915	43 Douglas, 1929
11 Pike, 1915	44 Coles, 1929
12 Winnebago, 1916	45 Macon, 1929
13 Kankakee, 1916	46 Edwards, 1930
14 Tazewell, 1916	47 Piatt, 1930
15 Edgar, 1917	48 Effingham, 1931
16 Du Page, 1917	49 Wayne, 1931
17 Kane, 1917	50 Macoupin, 1931
18 Champaign, 1918	51 Fulton, 1931
19 Peoria, 1921	52 Fayette, 1932
20 Bureau, 1921	53 Calhoun, 1932
21 McHenry, 1921	54 Ford, 1933
22 Iroquois, 1922	55 Jackson, 1933
23 DeKalb, 1922	56 Schuyler, 1934
24 Adams, 1922	57 Clinton, 1936
*25 Livingston, 1923	58 Washington, 1937
26 Grundy, 1924	59 Marshall, 1937
27 Hancock, 1924	60 Putnam, 1937
28 Mason, 1924	61 Wabash, 1937
29 Mercer, 1925	62 Vermilion, 1938
30 Johnson, 1925	63 St. Clair, 1938
31 Rock Island, 1925	64 Stark, 1939
32 Randolph, 1925	65 Boone, 1939
33 Saline, 1926	

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